SONG VARIATION AND OTHER VOCALIZATIONS OF VEERIES

By David E. Samuel

The flute-like song of the Veery (*Hylocichla fuscescens*) is one of the most beautiful of all passerines. Sonograms have been made of Veery songs (Stein, 1956; Borror, 1964), and other Veery calls have been discussed by Dilger (1956). Borror (1964) has shown these songs to be variable between individuals and also for individuals, and one can often distinguish the variations by ear. Veery song has two sections (Stein, 1956; Borror, 1964). The first section is a long ascending note (Position 1, Fig. 1 J). This is followed by the second section; a series of similar, descending phrases (Stein, 1956). In addition to the song, Dilger (1956) noted other hostile calls: the "veer," the "pheu," and "high-pitched windy, squealing sounds." The purpose of the present study is to compare the songs of individual brids and to present sonograms of other Veery vocalizations.

METHODS

This study was conducted from May to July 1969 and in May 1970 on and around the Terra Alta Biological Station of West Virginia University at Terra Alta, Preston County, West Virginia. Three individual birds were mist-netted and marked with paint (Veeries no 1, 2, 3) for recognition in the field, and 387 songs of these birds were analyzed. Songs of 16 other birds were recorded at various points up to two miles from the Biological Station on four successive days in 1969 and in 1970. Only birds from widely separated locations were recorded. This procedure greatly reduced the chance of recording an individual on more than one occasion. Most birds were recorded at dusk, but some recording was done from 06:00 to 09:00. Recordings were made in the field with a 24-inch parabolic reflector using a portable tape recorder (Norelco Carry-Corder), and the tapes were analyzed on a Kay Electric Company sound spectrograph, model 6061 B, at wide band settings. Songs of birds recorded by R. C. Stein in Washington and British Columbia were provided by the Laboratory of Ornithology, Cornell University.

RESULTS AND DISCUSSION

Song. Figure 1 J is a composite graph showing a typical 4-phrase song (following the terminology of Stein, 1956 and Borror, 1964). The numbers designate parts of the song that are subject to variation: 1, the first section of the song (always an ascending note); 2, first part of the first phrase (the portion of the phrase with ascending frequency); 3, upper part of the first phrase (that portion of the song, and the phrase, with the highest frequency); 4, lower part of the first phrase (those sound units located directly beneath portion 3 of the first phrase); 5, final part of first phrase (that portion with descending frequency); 6, upper part of last phrase (that portion of the last phrase with the highest frequency); 7, lower part of last

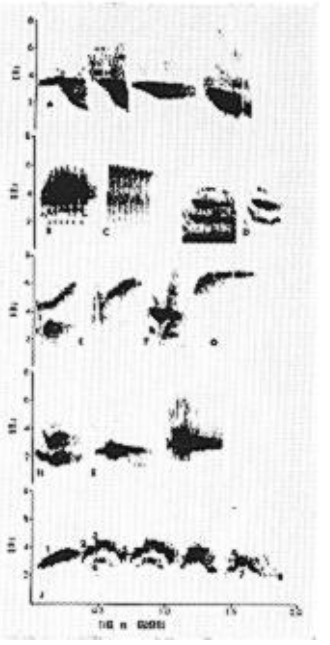

FIGURE 1. A. "Veer" calls of four individuals. B. "Chatter" call. C. "Trill" call. D. "Purr" calls of two individuals. E. "High whistle" calls of two individuals. F. "Low whistle" call. G. "Very high whistle." H. "Low veer" call. I. "Chur" calls of two individuals. J. A composite, typical song of four phrases.

phrase (those sound units located directly beneath portion 6 of the last phrase, not always present); 8, trailing portion of the song (not especially evident in Figure 1 J, but characteristic in most birds).

Individual Differences in Song. Individuals can often be identified by their songs, even though some variation exists among songs of one bird. Sometimes these differences are easily recognized by the human ear but for most a sonogram analysis is needed.

Numbers of phrases (few or many) and frequency changes may allow one to recognize easily a bird's song by ear. For example, Veery no. 8 (Fig. 2 B, C, D) gave many songs that had two phrases of high frequency followed by three or four fast phrases at low frequency. For other birds, the physical characteristics of a sonogram should be used to confirm identification. For example, Veery no. 9 could only be distinguished by the unclear pattern of the first two phrases of a sonogram not readily distinguishable by ear (Fig. 2 E). The unusual song of this bird made comparisons with a typical song (Fig. 1 J) difficult. Three sonograms of the songs of Veery no. 9 were similar.

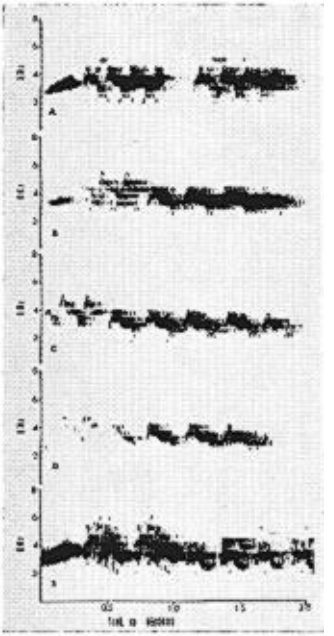

FIGURE 2. A. Two songs of Veery no. 8. Second song is without first section. B, C, is without first section. D. Songs of Veery no. 8. E. Song of Veery no. 9, typical for three sonograms recorded over a two-week period.

Close examination of the most common song pattern for ten Veeries showed consistent differences in various portions of the songs of each bird (Fig. 2, 3, 4, 5 and 6). The song of Veery no. 5 (Fig. 3 A) characteristically had a song unit with two peaks in the lower portion of the first phrase (position 4) and an extended trailing portion (position 8). All phrases for the song of Veery no. 6 (Fig. 3 B) showed three peaks in position 3 and two peaks at positions 4 and 7. The final portion of phrase one in position 5 was also extended. Veery no. 7 (Fig. 3 C and D) always showed five "units" in position 4. The songs of Veery no. 1 (Fig. 3 E) had an extended shape at position 2, five units at positions 3 and 4, plus an unclear first section (position 1). The first two phrases of this bird's songs differed greatly from the normal "umbrella" shape and the pattern was identical in nine songs. Veery no. 8 (Fig. 2 A, B, C, D) had an unusual song. The first part of the first phrases (position 2) was peaked, while the upper part (position 3) was incomplete. The descending portion at position 5 were well defined and extended (see Fig. 2 C, D).

Borror (1964) stated that Veeries sing 6-8 times a minute. Three birds (nos. 1, 2, 3), for which many songs were recorded, all gave at

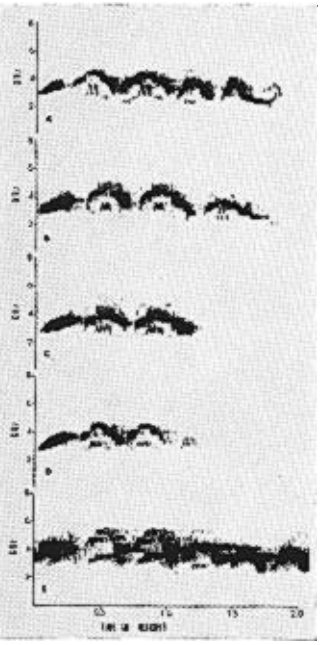

FIGURE 3. A. Song of Veery no. 5. B. Song of Veery no. 6. C and D. Songs of Veery no. 7. Five "song units" in positions 3 and 4 and a four peaked trailing portion in position 8 in 10 of 11 songs. E. Song of Veery no. 1. Five units in positions 3, 4, and 6 was typical of all 9 songs.

least 12 songs per minute (one every 5 seconds) (from Table 1). Individual differences in song frequency for these three birds were not significant ($P > .05$).

Song Patterns. Borror (1964) noted that most birds had two song patterns that differed in the character of the phrases. Most birds on my area also utilized two song patterns, one frequent, the other infrequent. In order to examine these song patterns, I graphed all songs in a vocal sequence for all birds.

Song patterns are usually a function of additional (but identical) phrases per song for each bird. For example, song patterns A and B for Veery no. 10 were almost identical except for an additional third phrase (but identical to the first two phrases) (Fig. 4 A, B). However, some birds utilized different song patterns with the same number of phrases per song. For example, Veery no. 1 A had six patterns, two of which had 4 phrases (Table 2). Bird 1 B used nine patterns, three of which had 4 phrases, two had 6, and two had 7 (Table 2). Bird 1 C used only three song patterns. Bird 10 utilized four songs; pattern A, B, and C were used with equal frequency (Table 2).

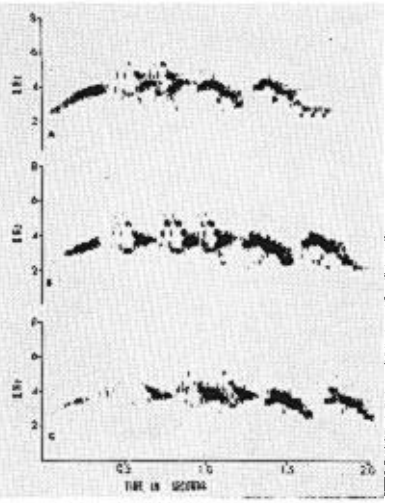

FIGURE 4. A. Song type A of Veery no. 10. B. Song type B of Veery no. 10. C. Song type C of Veery no. 10.

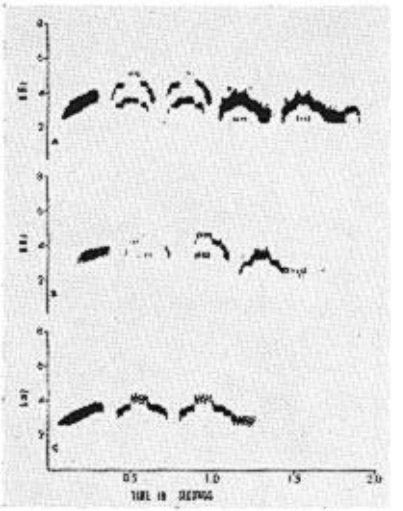

FIGURE 5. A. Song type A of Veery no. 13. B. Song type B of Veery no. 13. C. Song type C of Veery no. 13.

Sonograms of the three common song patterns of bird 10 were examined (Fig. 4 A, B, C). Total length of the two song patterns that had five phrases (B and C) were not significantly different ($P > .05$) (Table 3), and many physical similarities were evident. The first two phrases of song pattern A are similar to the first three phrases of song pattern B and also to the second and third phrase of pattern C. The first phrase of song pattern C differed from other

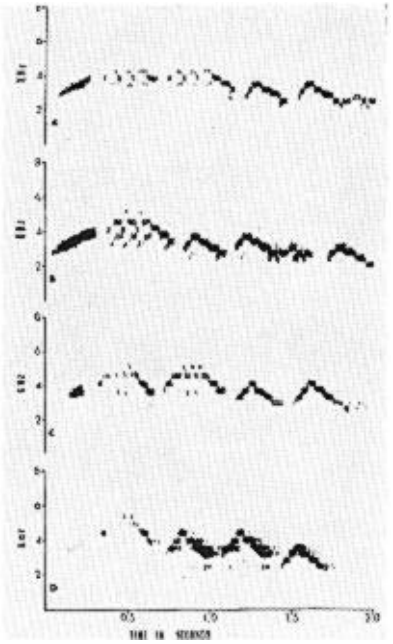

FIGURE 6. A. Song type A of Veery no. 15. B. Song type C of Veery no 15. C. Song type A of Veery no. 16. D. Song type B of Veery no. 16.

TABLE 1. Individual differences in the number of phrases per song, the average time between songs and the average time between "veers". Bird 4 was recorded by R. C. Stein at Horse Lake, British Columbia. All others were recorded at Terra Alta, West Virginia.

Bird	No. of phrases (± S.D.)	n	Song-song (± S.D.)	n	Veer-veer (± S.D.)	n
1	5.24 ± 1.26	120	4.35 sec. ± .13	130	3.11 ± .31	32
2	3.30 ± 0.41	203	4.78 sec. ± .27	155	3.23 ± .21	40
3	5.31 ± 0.52	64	3.31 sec. ± .51	52	2.71 ± .49	21
3A	3.81 ± 0.91	11	—	—	—	—
10	4.78 ± 0.22	59	—	—	—	—
13	3.12 ± 0.64	18	—	—	—	—
15	3.85 ± 0.41	17	—	—	—	—
16	4.00 ± 0.00	17	—	—	—	—
17	4.28 ± 0.47	17	—	—	—	—
18	4.00 ± 0.00	16	—	—	—	—
4	3.68 ± 0.18	38	—	—	—	—

TABLE 2. Song types and phrases of individual bird song recorded in one sequence.

	Song types	No. of phrases	n
Bird No. 1-A	A	5	5
	B	7	14
	C	6	20
	D	4	4
	E	3	3
	F	4	1
Bird No. 1-C†	A	3	55
	B	4	38
	C	2	30
Bird No. 1-B	A	4	22
	B	6	15
	C	4	5
	D	7	4
	E	7	15
	F	5	7
	G	4	6
	H	8	1
	I	6	1
Bird No. 10†	A	4	17
	B	5	25
	C	5	17
	D	6	3

†Songs recorded in three separate sequences.

introductory phrases. The first peak of the second section of the song resembled E in Figure 1. The final two phrases in patterns A, B, and C (all of lower frequency than initial phrases) appear basically the same, but small differences are present (Fig. 4).

The introductory higher frequency phrases were similar as were the final phrases in most individuals (Figs. 5 and 6). For example, bird 13 used two similar introductory phrases in all three song patterns (Fig. 5). Bird 15 utilized three song patterns, the two in Figure 6 and a third that was identical to type A, but had no first section. For a few individuals the final phrase (and the final notes of position 8) of one song pattern became the next to last phrase in another pattern (Bird no. 15, Fig. 6).

In summary, all birds used at least two song patterns. For some (no. 10, for example) each song pattern was different. For other birds, patterns differ by the addition or deletion of identical phrases of either high or low frequency (Figs. 5 and 6). Some songs lack both types of phrases; Veery no. 13 used only high frequency phrases in pattern C (Fig. 5 C). Others might have distinctly different phrases of intermediate frequency; the two middle phrases of pat-

TABLE 3. Length of the first section, each phrase and total lengths (in mm) for the three common song types of Veery no. 10.

Song type	First section	Phrase 1	Phrase 2	Phrase 3	Phrase 4	Phrase 5	Song length	n
A	3.40 ± 1.76	2.77 ± 0.33	2.77 ± 0.39	3.72 ± 0.25	4.75 ± 1.73	— —	18.75 ± 0.84	4
B	3.88 ± 0.50	3.26 ± 0.16	2.90 0.50	2.84 0.25	3.61 ± .33	4.45 ± 1.14	22.30 ± 1.27	5
C	3.00 ± 0.47	5.70 ± 0.48	3.17 ± 0.17	2.95 ± 0.26	3.40 ± 0.30	4.10 ± 0.00	24.00 ± .73	4

TABLE 4. Frequency of the number of phrases per song for six veeries. Bird no. 4 was recorded by R. C. Stein at Horse Lake, British Columbia. All others were recorded at Terra Alta, West Virginia. Only birds with more than 10 songs were tabulated.

	Phrases Per Song											
No. of phrases	Bird No. 1	%	Bird no. 2	%	Bird no. 3	%	Bird no. 3A	%	Bird no. 10	%	Bird no. 4	%
2	0	00.0	40	19.7	0	00.0	0	00.0	0	00.0	0	00.0
3	3	02.5	71	34.9	4	06.3	4	36.4	0	00.0	9	23.7
4	48	40.0	74	36.5	12	18.6	6	54.6	15	25.4	29	76.3
5	21	17.5	16	07.9	14	21.9	0	00.0	41	69.5	0	00.0
6	27	22.5	2	01.0	24	37.5	1	09.0	3	5.1	0	00.0
7	17	14.2	0	00.0	9	14.1	0	00.0	0	00.0	0	00.0
8	4	03.3	0	00.0	1	04.8	0	00.0	0	00.0	0	00.0
Total No. of Songs	120		203		64		11		59		38	

tern B, Veery no 16 (Fig. 6 D). Finally, a song pattern of one bird differed in the absence of the first section of the song (Fig. 1 J).

Song Phrases. A variation in the number of phrases per song was noted (Tables 1 and 4). All Veeries utilized 2-8 phrases per song (Table 4). Veery no. 8 (Fig. 2 A, B, C, D) used songs with 3-7 phrases. About 90 per cent of the songs given by Veery no. 2 had two, three or four phrases, whereas 93 per cent of the songs given by Veery no. 1 had four to seven phrases.

Stein (1956) noted a range of three to six phrases per Veery song, although four phrases was the most common. These birds were recorded in Ontario, Wisconsin, New York, and Maryland. Borror (1964) noted one to six (usually three to four) phrases per song for birds recorded in Maine. The mean number of phrases for 530 songs given by eleven birds on my study area was 4.20 (from Table 1).

Calls. Veeries use a variety of calls during encounters with other Veeries. The most common call was the "veer" (Fig. 1 A), given back and forth between two perched birds. Songs may be interspersed, but an individual would "veer" about every three seconds (Table 1). Birds utilized this call simultaneously when perched far apart (200 feet) but only two or three birds answered when close together. Dilger (1956) believed that the "veer" call was given during low intensity hostile encounters. I do not know if individuals can recognize the "veer" of another Veery, but differences in calls of four birds can be seen in the sonograms (Fig. 1 A).

All the following calls were given at dusk during high intensity hostile encounters (i.e., when two or three Veeries were perched in adjacent trees). One common vocalization given approximateely one second before the song during encounters was the "trill" (Fig. 1 C). On one occasion two veeries, perched in adjacent trees, gave an occasional "trill" without a following song. The "high whistle" (Fig. 1 E), an almost unaudible "very high whistle" (Fig. 1 G) and the "chatter" (Fig. 1 B) were given occasionally. Once a Veery was perched and singing at dusk when a Robin (*Turdus migratorius*) attempted to land on the same limb but was immediately chased by the Veery with an accompanying "chatter." Robins were chased by Veeries on five other occasions, but no calls were heard. The "low veer" (Fig. 1 H) was given reciprocally by birds perched in adjacent trees and seldom did a bird call more than 10 times in succession. "Low veers" were not always given during high intensity encounters and were occasionally interspersed during "veer" calls at daytime or dusk. The "chur" (Fig. 1 I) was often answered by a "chur" from another Veery. A "low whistle" (Fig. 1 F) and a "purr" (Fig. 1 D) were noted only once, and I do not know if these are variations of mentioned calls or if they are different calls.

On 18 July, I arrived at the study area at 20:00. No birds were singing, and at 20:30 I played a tape of Veery song recorded earlier in the year. This brought songs immediately from three birds. Two of these birds flew into adjacent trees and gave the following calls over a seven-minute span: 32 songs, 75 "veers," 22 "low veers", 10 "trills," 9 "high whistle," 8 "churs," 6 "chatters," 4 "very high

whistles," 1 "low whistle," and one "purr." The importance of all these calls given under similar circumstances is not understood. It is also not known whether an individual bird utilized all calls when in a song duel with another Veery. This list of calls given during hostile encounters between two birds is probably incomplete and a study of their communicatory function would be interesting.

Summary

Sonograms were made of songs and calls of the Veery in West Virginia. Individual differences in sonograms were noted for 16 birds. The mean number of phrases in 530 songs given by 11 birds was 4.20. Differences in the interval between successive songs for these birds were also noted, and there was a range of 2-8 phrases per song. Birds utilized as many as nine song patterns, with an average of two to four. Seven calls were noted during high intensity encounters; the "trill" was most common followed by the "high whistle," "chur," "chatter," "very high whistle," "low whistle," and "purr." "Veers" and "low veers" were given during such encounters, but they were also given reciprocally at other times.

Acknowledgments

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